INDEX TO VOLUME XII.

[NOTE.—In this index the titles of principal papers and the headings of departments, as *Discussion*, are in italics.]

Absence of water in certain sandstones of the Appalachian oil fields (Reeves), 354; discussion, 610
Acidity of water, 63
Accumulation of peat, rate of, 530
Accumulation of petroleum, The petrology of reservoir rocks, and its influence on the (Lauer), 435
Agawa iron-bearing formation, 665
Air-filled sediments exclude water, 366
Alkali flats, 592
Alkalinity of water, 63
Allen, E. T., analysis by, 521; on sulphides of iron, 301
Allen, E. T., Crenshaw, J. L., and Johnson, on contact metamorphism, 151
Alteration, norite, Engels, Cal., 6
Alteration, olivine to serpentine, 162; peridotite to serpentine, 157; pyroxene to serpentine, 162; Sudbury ores, 576
Aluminium hydrates, 282
Aluminum, recent literature on, 99
Alumogel, 284
Analyses, chemical (*see* Chemical analyses)
Analyses, correcting errors in, 67
Andradite, analysis, 248
Anthracite, increase in royalties on, 49
Anticlinal theory of oil accumulation, 437
Antimony, recent literature on, 99
Aplite, 243
Aplitic dikes, 175
Appalachian geosyncline, structure, 41
Appalachian oil-field brines, Note on (Richardson), 39
Appalachian oil fields, structure, 356
Appalachian oil fields, The absence of water in certain sandstones of the (Reeves), 354
Argall, Philip, on Leadville ore deposits, 251
Argentite, 320, 348, 708
Arsenopyrite, 302, 342
Arsenosulphides, conduct with silver sulphate solution, 218
Artillery officers, training of, 628
Asbestos, eastern townships, Quebec, 154; slip-fiber, 200
Ashley, G. H., on oil-shale, 508
Atwood, W. W., discussion by, 545; on peneplanation in the Rocky Mountains, 542
Aztec deposits, Arizona, 265

Backe, H. E., on contact metamorphism, 151
Bacon, Francis, on duty to the profession, 122
Bacon, R. F., and Hamor, W. A., review of book by, 387
Bailey, E. H. S., on manganese at Hutchinson, 474
Bailey, R. K., with Hicks, W. B., analysis by, 39
Baker, M. B., on origin of Sudbury ores, 428
Bald Hill oil pool, sand from, 450
Bald Hill-Morris oil district, sand from, 451
Banded galena ore, 645, 647; Minnie Moore Mine, Idaho, 655
Banded segregations of Duluth gabbro, 683
Barlow, A. E., on genesis of Sudbury ores, 564; on ore deposits of Cobalt district, 220; on Sudbury deposits, 393, 399
Barrell, Joseph, on deposition of Catskill beds, 373
Baskerville, C., on oil-shales, 508
Bastin, E. S., *Significant mineralogical relations in silver ores of Cobalt, Ontario*, 219–236; on mine waters at Tonopah, Nev., 86; on stephanite in Gilpin County ores, 318; on the identification of minerals, 697, 706
Bateman, A. M., *Magmatic ore deposits, Sudbury, Ont.*, 391–426; discussion by, 628; reviews by, 286,

637; on deformation in Sudbury rocks, 573
Bauxite, 282
Bayles, J. C., on engineering ethics, 107
Bayley, W. S., on massive rocks of the Lake Superior region, 668
Beaver Creek oil sand, 453
Beck, R., on genesis of Sudbury ores, 565; on the nature of ore deposits, 607
Becker, G. F., on salt in sedimentary rocks, 41
Beeson, J. J., on enrichment at Bingham, 21
Behrens, H., on microchemical technique, 710
Belt series, 644
Berea sand, 359
Berea sandstone, 449
Bergman, H. F., on peat bogs, 532
Big Injun oil sand, 359, 369, 371
Bird Creek oil field, sand from, 452
Bituminous coal industry, 49
Black Lake-Thetford area, geology, 155
Blackwelder, Eliot, discussion by, 541
Blow, A. A., on the occurrence of sphalerite, 301
Bond, Josiah, on silver-bearing diorite in southern Arizona, 242
Bonillas, Y. S., Tenney, J. B., and Feuchère, Leon, on siderite at Bisbee, 31
Booch oil sand, 451
Borings, deep, 361
Bornite, 15, 328, 344, 350
Boutwell, J. M., on silver ores of Bingham, Utah, 304
Bownocker, J. A., on oil in the Berea sand, 450
Brackenbury, C., on genesis of Sudbury ores, 564
Bradley, W. W., review of book by, 292
Brauns, R., on contact metamorphism, 151
Breithauptite, 224, 331
Brines, analyses of, 39, 374
Broderick, T. M., *The relation of the titaniferous magnetites of northeastern Minnesota to the Duluth gabbro*, 663–696
Broken Hill oil field, sand from, 451
Brongniardite, 327
Browne, D. H., on genesis of Sudbury ores, 564; on segregation in matte, 406
Bucher, W. H., review by, 203
Burgess, J. A., *The halogen salts of silver at Wonder, Nevada*, 589–593
Burr, W. H., on engineering ethics, 110
Butts, Charles, on Catskill marine fossils, 620

Cadell, H. M., on the Scottish oil-shale industry, 518
Calcite, 17, 224
California, mineral production, 292
Calkins, F. C., on rocks of the Cœur d'Alene district, 150
Campbell, W., on grinding and polishing apparatus, 698
Campbell, W., and Knight, C. W., on ore deposits of Cobalt district, 220; on the origin of Sudbury ores, 401, 412, 429, 565; on Timiskaming ores, 331
Capillary concentration of petroleum, 439
Carborundum for polishing, 703
Cascajal salt dome, 586
Catskill formation, 620; conditions of deposition, 626; geologic conditions during deposition, 367; sands, 359, 372
Cerargyrite, 326
Chalcocite, 32, 330; formation of, 3
Chalcopyrite, 15, 328, 344, 398, 401
Chalmersite, $CuFe_2S_3$, in the ore deposits of Prince William Sound, Alaska, Preliminary note on the occurrence of (Johnson), 519
Chalmersite, occurrence and characters, 519; analysis, 521; geographic distribution, 522
Chamot, E. M., on microchemical reactions, 710
Chemical analyses—banded segregations of Duluth gabbro, 685; brines, West Virginia and Pennsylvania, 374; chalmersite, 521; chrysotile asbestos, 161; diabase, Tetiuxe district, Siberia, 273; garnet, 248; gossan, Tetiuxe mine, Siberia, 276; groundwater, Midway oil field, 76; inclusions of banded Gunflint formation, 680; irregular bodies of titaniferous magnetite, 688; limestone, Tetiuxe district, Siberia, 271; manganese material, 474; mine waters from Tonopah, Nev., 86; ocean water, 79; peat, 536; peridotite, 159; quartz porphyry, 273; quartzite, Tetiuxe district, Siberia, 272; sandstone, Tetiuxe district, Siberia, 272; serpentine, 161; smal-

tite, 209; surface waters of Oregon, 81; water, Tetiuxe mine, 278; water from deep wells, western Pennsylvania, 39; zinc carbonate ore, 276
Chilean nitrate deposits, genesis, 89, 92
Chloanthite, 331
Chloritization, 12
Choctaw coal lands, valuation and royalties, 52
Chromic oxide for polishing, 703
Chrysotile, curved or bent fiber, 199; relation to massive serpentine, 185; serpentine belt, Quebec, 154; slip-fiber, 200; specific gravity, 188
Chrysotile asbestos, chemical analysis, 161; origin, 183
Chrysotile veins, junction and intersection, 200; origin, 195, 476
Cirkel, Fritz, on chrysotile-asbestos, 156
Clapp, F. G., *Ethics of the petroleum geologist*, 105–137; on the accumulation of petroleum, 439
Clarke, F. W., on chloride waters, 41; on virgin waters, 490
Classification, magnetite deposits of Duluth gabbro, 677; Engels ore deposit, 25; petroleum geologists, 111; rocks for engineering work, 281; waters, 61, 497, 498
Classification, Genetic, of underground volatile agents (Daly), 487
Classification of ore deposits based upon origin, deformation, and enrichment (Quirke), 607
Clements, J. M., on stratigraphy of Duluth gabbro area, 664
Climate, influence on peat formation, 527
Coal, The cost of (Smith and Lesher), 42
Coal, conservation in the use of, 637; consumption per capita, 42; factors controlling price, 43; marketing cost, 47; mining cost, 44; recent literature on, 100; resource cost, 48; selling cost, 45; transportation cost, 46; tribute to private ownership, 48
Coalinga oil field, waters from, 83
Coatzacoalcos region, Mexico, 581
Cobalt, Ontario, silver ores, 219
Cobalt, recent literature on, 98
Cobalt and nickel minerals associated with silver, 330
Cobalt diarsenide, 210
Cobaltite, 210
Code of ethics, 109
Coleman, A. P., *Magmas and sulphide ores*, 427–434; on Sudbury deposits, 393, 394, 401; on the norite of Sudbury, 564, 572
Color filters for photomicrographic work, 712
Color of Minnesota peat, 535
Conglomerates of the Witwatersrand, 717
Connate dryness, 610
Connate water, 40, 495; disappearance of, 364
Conner, M. F., analyses by, 159, 161
Contact-metamorphic deposits, Patagonia district, Ariz., 258; contact-metamorphic deposits, southern Arizona, 247
Contact metamorphism, Minnesota, 667
Cooke, H. C., on secondary enrichment of silver ores, 299; on the relation of sulphates in solutions, 214
Copper, Engels mine, Cal., 2; recent literature on, 98
Copper deposits of Engels, Cal., 379
Copper minerals associated with silver, 328
Cordierite, 670
Core made by diamond drill, 701
Corning oil pool, sand from, 449
Cortez well, rock from, 457
Cost of coal, The (Smith and Lesher), 42
Covellite, 23, 32, 330; mode of formation at Engels, Cal., 5
Craig, E. H. C., on oil-shale, 505
Crean Hill mine, 431
Creighton ore body, Sudbury, 396
Criner Hills, 602
Crosby, W. O., on contact deposits of Washington camp, Ariz., 247
Cross, Whitman, on laminated galena ore, 655
Cross section, Appalachian oil fields, 357
Crystallization, 193
Cunningham-Craig, E. H., on oil-shale, 505
Cushing oil field, sand from, 448, 466

Dakota sandstone, Kansas, 473
Daly, R. A., *Genetic classification of underground volatile agents*, 487–504; on genesis of Sudbury ores, 565; on temperature of magmas, 693
Dana, J. D., on accumulation of peat, 530

Daubrée, A., on term phreatic, 494
Davis, C. A., on original of marl, 529; study of oil-shale by, 510
Day, D. T., on fractionation of oil by fuller's earth, 441; on migration of oil, 378
Deformation of ore deposits, 607
Depth of peat accumulation, 529; relation of dryness to, 612
Diabase, analysis of, 273
Diamond drill, 701
Diagrams—classes of waters, 65; ore classification, 608
Diarsenides as silver precipitants (Palmer), 207
Diarsenides, conduct with silver sulphate solution, 217
Dickson, C. W., on the origin of Sudbury ores, 399, 400, 411, 422, 565
Differentiation, magmatic, 178; of nickel-eruptive, 573
Dike-like bodies of titaniferous magnetite, 690
Dikes of magnetite, 692; origin, 693
Diopside dikes, 174
Discussion—
The absence of water in certain sandstones of the Appalachian oil fields (Shaw), 610
Aluminium hydrates (Wysor), 282
The conglomerates of the Witwatersrand (Tyrrell), 717
Genesis of Success zinc-lead deposit (Hershey), 548
Genesis of the Chilean nitrate deposits (Sundt), 89
The geologist in war times—the training of artillery officers (Bateman), 628
The need of accurate rock classification in engineering contracts (Mitchell), 281
Ore deposition and enrichment at Engels, California (Tolman), 379
The origin of chrysotile veins (Taber), 476
Physiographic conditions and copper enrichment (Blackwelder), 541; (Atwood), 545
A study of some heating tests (Tarr), 280
Distillation of oil-shale, 517
Disulphides, conduct with silver sulphate solution, 218
Doelter, C., on vadose water, 494
Dolomite, in salt domes, 584
Dolomites, openings in, 452
Dolomitization cavities, 444
Dresser, M. A., *Some quantitative measurements of minerals of the nickel-eruptive at Sudbury*, 563–580; on origin of chrysotile, 183, 477; on serpentine rocks of southern Quebec, 155
Drift, in Minnesota, 528
Dry sands, explanation of, 615; relation to continental deposits, 620
Drying of sands after burial, 622
Dryness, connate, 610
Dryness of sands, Appalachian oil fields, 362
Duluth gabbro, 665
Duluth gabbro area, stratigraphy of, 664; topography of, 664
Duncan gas field, Oklahoma, 594
Dunlap sand, 600
Dykes, vesuvianite, 174
Dyscrasite, 326

Eastman Kodak Company, on photography of colored objects, 713
Economic geology, by Heinrich Ries, review of, 286
Economic geology, recent literature on (*see* Recent, etc.)
Economic possibilities of titaniferous ores, 685
Edmonton sandstones, 717
Edwards, M. G., review by, 292
Elements of mineralogy, crystallography, and blowpipe analysis (review of), 559
Elftman, A. H., on contact metamorphic rocks in Minnesota, 668
Ely greenstone, 665
Embolite, 590, 592
Emery for polishing, 703
Emmons, S. F., on ore deposits of Cobalt district, 220
Emmons, W. H., on precipitation from mixed solutions, 591; on regionally metamorphosed ore deposits, 657; on the enrichment of sulphide ores, 607; on the occurrence of sphalerite, 302; on use of term vadose, 494
Enargite, 17
Endomorphism, Cœur d'Alene district, Idaho, 147
Engels, Cal., ore deposition and enrichment at, 1; zones of oxidation and enrichment, 20
Engineering ethics, papers on, 134
Enrichment, at Engels, Cal., 1, 19; of silver ores, Cobalt, 221
Enstatite, 165

Epigeal, definition of, 493
Epidote, 15
Epigene, definition, 492
Epigene waters, 494
Equations, alteration of olivine and of pyroxene to serpentine, 163; silver precipitants, 211
Errors in analyses, correcting, 67
Etching under the microscope, 709
Ethics of the petroleum geologist (Clapp), 105
Exclusion of water by air-dried sands, 621
Exfoliation fractures, 180
Exomorphism, Cœur d'Alene district, Idaho, 144
Expansion attending alteration, 171
Experiment, water penetration of dry sand, 366
Exploration in Duluth gabbro area, Minnesota, 676
Exposure in photomicrographic work, 713

Fath, A. E., criticism of review by, 290
Fayalite, 678
Fees of professional men, 125
Feldspar, recent literature on, 100
Fenner, C. N., on stephanite at Leadville, 318
Fiber of chrysotile, 190, 199
Filisola salt dome, 585
Filtration theory of oil accumulation, 441
Finlayson, A. M., on tetrahedrite at Rio Tinto, Spain, 307
Foraminiferal rocks, 458
Formation, of chalcocite, 3; of peat deposits, conditions, 526
Forsterite, 159
Foullon, Baron von, on genesis of Sudbury ores, 564
Four Metals deposit, Arizona, 261
Fox oil and gas field, Oklahoma, 594
Foye, W. G., on titaniferous magnetite deposits, 682
Freibergite, 306, 707
Fuel, peat, 538
Fullerton oil fields, sand from, 450

Gabbro, Duluth, 666
Galena, 303, 342, 346
Galena ore, banded, 645; sections, 658
Galena ore, Gneissic, from the Slocan district, British Columbia (Uglow), 643
Gangue minerals associated with silver, 333
Garnet, analysis of, 248
Gautier, A., on virgin waters, 490
Geikie, A., on use of term epigene, 493
Genesis of, Chilean nitrate deposits, 89, 92; Cobalt silver ores, 219, 235; Engels, Cal., ore deposits, 25; nickel-copper ores, Sudbury, 564; Success zinc-lead deposits (discussion), 548; Sudbury ore deposits, 633; zinc ores, Tetiuxe district, Siberia, 278 (*see also* Origin)
Genesis of the metals in the Santa Rita-Patagonia mountains, Arizona, The geologic distribution and (Schrader), 237
Genesis of the Success zinc-lead deposit, Cœur de'Alene district, Idaho (Umpleby), 138
Genetic classification of Engels ore deposit, 25
Genetic classification of underground volatile agents (Daly), 487
Geologic distribution and genesis of the metals in the Santa Rita-Patagonia mountains, Arizona (Schrader), 237
Geologic map—Success mine, Cœur d'Alene district, 140 (*see also* Maps)
Geologic occurrence of chalmersite, 522
Geologist and client, relation between, 115
Geologist in war times, 628
Geology of, Coatzacoalcos region, Mexico, 581; Healdton oil field, 595; Santa Rita-Patagonia mountains, 239; serpentine area, southern Quebec, 155; Slocan district, B. C., 643; Success mine, Cœur d'Alene district, 139; Sudbury, Ont., district, 394; Tetiuxe district, Siberia, 271; Wonder, Nevada, 588
Geology and ore deposits of the Tetiuxe district, Russia (Nishihara), 270
Gibbsite, 283
Glacial influence on peat formation, 528
Gneissic galena ore, Cœur d'Alene district, 655
Gneissic galena ore from the Slocan district, British Columbia (Uglow), 643
Gold, in Edmonton sandstones, Alberta, 717; in the Klondike district, 719; recent literature on, 98
Goodchild, —, on Insizwa nickel ores, 428

Gordon sand, 361, 372
Gossan, yellow, Tetiuxe mine, Siberia, 276
Graham, R. P. D., *Origin of massive serpentine and chrysotile-asbestos, Black Lake-Thetford area, Quebec,* 154–202
Graham oil field, Oklahoma, 594
Granite, 241; heating tests on, 280
Granite porphyry, 242
Granite zinc-lead deposit, 138
Grant, U. S., on contact metamorphism of a basic igneous rock, 667; on inclusions in Duluth gabbro, 679; on muscovadite, 673
Graphic intergrowths, 23; Sudbury, 569
Graphic structure, 23
Graton, L. C., and McLaughlin, D. H., *Ore deposition and enrichment at Engels, California,* 1–38
Graton, L. C., and Murdock, Joseph, on copper enrichment, 255; on sulphide ores of copper, 298
Gravity, Oklahoma oils, 604
Greaterville placers, 255
Greenbrier formation, 358
Green River oil-shale, 506, 508; composition, 511; value, 512
Grinding ores for microscopic examination, 699, 700
Griswold, W. T., and Munn, M. J., on the anticlinal theory of oil accumulation, 437
Ground-water, definition, 489
Grout, F. F., on banded segregations of Duluth gabbro, 683
Grünling, F., on maucherite, 208
Guild, F. N., *A microscopic study of the silver ores and their associated minerals,* 297–353; on silver minerals, 707
Gunflint formation, 666, 667, 675
Gypsum, in salt domes, 584

Halogen salts of silver at Wonder, Nevada (Burgess), 589
Hammond, J. H., on professional ethics, 107
Happy Jack mine, Arizona, 260
Hardness of water, 63
Hares, C. J., review by, 387
Hartley, Burton, *The petroleum geology of the Isthmus of Tehuantepec,* 581–588
Hay, R., on use of term phreatic, 495
Healdton Hills, 596
Healdton oil, character of, 603
Healdton oil field, Oklahoma (Powers), 594–606
Healdton sands, 598, 600
Heating tests on granite, 280
Hedenbergite, 274
Hershey, O. H., discussion by, 548; on ore deposits of Cœur d'Alene district, 138
Hicks, W. B., and Bailey, R. K., analysis by, 39
Hilgard, E. W., on the geologic efficacy of alkali carbonate solution, 85
Hill, J. M., on tungsten minerals in Arizona, 258
Hills, V. G., on professional ethics, 117
Hoing sand, 448, 466
Holmes, J. A., on titaniferous iron ores, 686
Hore, R. E., on ore deposits of Cobalt district, 220
Hornfels, 669, 672
Howe, Ernest, on Sudbury ores, 392, 399, 403, 414, 433, 565
Hundred-foot sand, 359, 370, 371
Huntilite, 326
Huntley, L. G., with Johnson, R. H., review of book by, 290
Hussak, E., on chalmersite, 521
Hutchison, L. L., on oil rock in Oklahoma, 450
Hydration of olivine, 167
Hydraulic theory of oil accumulation, 438
Hydrothermal origin of Sudbury ores, 411, 415
Hydrothermal sulphides, development of, 15

Identification of minerals, 706
Igneous rocks, Black Lake-Thetford area, 155; Santa Rita-Patagonia mountains, Arizona, 240
Illuminator for microscopes, 704
Ilmenite, 282, 686, 694
Inclusions of banded Gunflint iron formation, 677
Interpretation of water analyses by the geologist (Rogers), 56
Inviolability of professional confidences, 118
Iodobromite, 590, 592
Iodyrite, 590, 593
Iron, recent literature on, 98
Iron ores of Duluth gabbro, 675
Iron oxides, development at Engels, Cal., 10
Irvine oil sand, 453, 467

Irving, J. D., on juvenile waters, 491; on openings in rocks, 441; on replacement deposits, 412
Irving, J. D., and Bancroft, H., on ore deposits near Lake City, Colo., 263, 303
Isthmus of Tehuantepec, The petroleum geology of the (Hartley), 581
Ixhuatlan salt dome, 585

Jackson sand, 600
Jarosite, 591
Johnson, B. L., *Preliminary note on the occurrence of chalmersite, $CuFe_2S_3$, in the ore deposits of Prince William Sound, Alaska*, 519–525
Johnson, R. H., on connate water, 365
Johnson, R. H., and Huntley, L. G., on selective segregation theory of oil accumulation, 440; review of book by, 290
Juvenile, definition, 489
Juvenile fluids, 491

Kaolin, 283; at Engels, Cal., 27
Kaolinite, 282
Kalickij, K., on migration of oil, 378
Kato, T., on native silver, 322
Keilhack, K., on magmatic waters, 490
Kemp, J. F., discussion by, 632; on magmatic water, 489; on waters, meteoric and magmatic, 355
Kerr Lake mine, ore from, 232
Klondike district placers, 719
Knife Lake slates, 665
Knight, C. W., on genesis of Sudbury ores, 565; on Sudbury deposits, 393, 400, 404, 412, 428

Laccolith, Duluth gabbro, 667
La Concepcion salt dome, 586
Lander oil field, sand from, 451
Lane, A. C., on connate water, 40; on magmatic waters, 490
Laney, F. B., on intergrowths in copper ores, 314
Lattice structure, 21
Lauer, A. W., *The petrology of reservoir rocks and its influence on the accumulation of petroleum*, 435–472
Lawson, A. C., on magmatic waters, 490
Lead, recent literature on, 98
Lead ores, Slocan district, 645
Leith, C. K., on schistose texture, 653
Leith, C. K., and Mead, W. J., on magmatic waters, 490
Leitz metallographic microscope, 704, 706
LeRoy, O. E., on the Slocan district, 643
Lesher, C. E., with Smith, G. O., *The cost of coal*, 42–55
Leverett, Frank, on surface formations of Minnesota, 528
Library Service Bureau of the United Engineering Society, list prepared by, 134
Liesegang, A. E., on rhythmic precipitation. 224
Limestone, analysis, 271
Limestones, openings in, 452
Lincoln, F. C., on classes of emanations, 491
Lindgren, W., on genesis of Sudbury ores, 565; on openings in rocks, 441; on ore deposits near Lake City, Colo., 263
Lindgren, W., and Irving, J. D., on banded galena ore, 656
Lindgren, W., and Ransome, F. L., on tetrahedrite in Cripple Creek district, 307
Line Boy deposit, Arizona, 258
Literature on economic geology, Recent (*see* Recent, *etc.*)
Lithomarge, 283
Low oil field, Oklahoma, 594
Löllingite, 211; reaction, 231

McCay, L. W., on massive sagflorite, 215
McCloskey sand, 453, 467
McConnell, R. G., and Brock, R. W., on the Slocan district, 643
Machine peat, 539
McLaughlin, D. H., with Graton, L. C., *Ore deposition and enrichment at Engels, California*, 1–38
McKinley, W. B., on promotions, 128
Magmas and sulphide ores (Coleman), 427
Magmatic, definition, 492
Magmatic ore deposits, Sudbury, Ont. (Bateman), 391
Magmatic segregation, Sudbury ores, 405, 414, 429
Magmatic sulfid ores (review of), 632
Magnesite, 170
Magnetite, 159, 160, 570, 693
Magnetites, titaniferous, of northeastern Minnesota, The relation of

the, to the Duluth gabbro (Broderick), 663
Magnetites formed by emanations at igneous contacts, 682
Manganese in the Dakota sandstone of central Kansas (Whitaker and Twenhofel), 473
Manufacture of peat fuel, 538
Maps—Appalachian oil fields, 356; Duluth gabbro, 671; Isthmus of Tehuantepec, Mexico, 582; Mexican oil fields, 459; Oklahoma, southern, showing location of oil and gas fields, 595; Success mine, Idaho, 549; Tetiuxe mine, Siberia, 270 (*see also* Geologic maps)
Marble, recent literature on, 100
Marcasite, 317
Marginal deposits, Sudbury, 396
Maricopa oil field, sand from, 451
Marketing cost of coal, 47
Marl beds, relation to peat formation, 529
Matte, segregation in, 406
Maucherite, 208; reaction, 231
Maxton sand, 358, 369, 370
Measurements, Some quantitative, of minerals of the nickel-eruptive at Sudbury (Dresser), 563
Mellor, E. T., on conglomerates of the Witwatersrand, 717
Metalliferous deposits in Santa Rita-Patagonia mountains, Arizona, 244
Metallographic investigation of titaniferous magnetite, 686
Metallographic microscope, 704
Metamorphism, Cœur d'Alene district, Idaho, 144
Meteoric, definition, 492
Mexican oil fields, map, 459
Microchemical determination of minerals, 334
Microchemical tests, table, 711
Micropegmatite, 563
Microphotographs (*see* Photomicrographs)
Microscope for mineragraphy, 703
Microscopic determination of opaque minerals, 334
Microscopic study of the silver ores and their associated minerals (Guild), 297
Midway oil fields, sand from, 451; waters of, 74; analyses, 76
Miers, H., on pyrargyrite and proustite, 317
Migration of water and oil, 618, 625
Miller, B. L., with Singewald, J. T., Jr., discussion by, 92, 95
Miller, W. G., on ore deposits of Cobalt district, 220, 222
Mineragraphy, 97
Mineragraphy, Notes on the technique of (Whitehead), 697
Mineral composition of Sudbury nickel-eruptive, 566
Mineral production of California, 292
Mineral sequence, at Engels, Cal., 24
Mineralogical relations in silver ores of Cobalt, Ontario, Significant (Bastin), 219
Mineralography, 96
Minerals, identification of, 706; of the Sudbury ores, 398
Minerals of the nickel-eruptive at Sudbury, Some quantitative measurements of (Dresser), 563
Mining cost of coal, 44
Minnesota, magnetic iron ores of, 663; topographic divisions, 527
Minnie Moore mine, laminated galena ore, 655
Miocene, Isthmus of Tehuantepec, 582
Mississippian series, formations of, 358
Mitchell, G. J., discussion by, 281
Molybdenum, 256; recent literature on, 99
Morning Glory mine, Patagonia district, Arizona, 265
Moses, A. J., and Parsons, C. L., review of book by, 559
Movement of water in oil sands, 377
Mowry mine, Patagonia district, Ariz., 250, 251
Munn, M. J., on the accumulation of petroleum, 438; on water in oil sands, 362
Munn, M. J., and Griswold, W. T., on water in oil strata, 372
Murdoch, Joseph, on microscopic determination of opaque minerals, 334; on stromeyerite, 309; on the identification of minerals, 697, 706
Muscovadite, 668, 672
Muskogee oil sand, 452

Nelson batholith, 644
Nettie L mine, Ferguson, B. C., 309
Nevada Wonder vein, 590
Newland, D. H., on magnetic iron ores, 691
Niccolite, 207, 224, 233, 331, 350; reaction, 231
Nickel, recent literature on, 99
Nickel deposits, Sudbury, 395

Nickel-copper ores, Sudbury, genesis, 564
Nickel-eruptive at Sudbury, Some quantitative measurements of minerals of the (Dresser), 563
Nishihara, G. S., *Geology and ore deposits of the Tetiuxe district, Russia*, 270–279
Nissen, A. E., and Hoyt, S. L., on silver in galena ores, 304
Nitrate deposits, Chilean, genesis, 89, 92
Norite, 563; of Sudbury, ore minerals of, 570; solidification of, Engels, Cal., 5
Norris, R. V., on royalties on anthracite, 48
Note on Appalachian oil-field brines (Richardson), 39
Notes on the technique of mincragraphy (Whitehead), 697

Ocean water, analysis of, 79
Ocean water, properties of reaction and concentration, 78
Offset deposits, Sudbury, 396
Ogishke conglomerate, 665
Oil, position in synclines, 363; recent literature on, 100; Tehuantepec Isthmus, origin, 588 (*see also* Petroleum)
Oil and gas production, principles of, 290
Oil field, Appalachian, 355
Oil field, The Healdton, Oklahoma (Powers), 594–606
Oil field development and petroleum mining (Thompson), review of, 480
Oil fields of Mexico, reservoir rocks, 455
Oil sands, Pennsylvania, water content, 358
Oil-shale, definition, 505; occurrences in United States, 507; plant remains in, 510, 515
Oil-shale in the United States (Winchester), 505
Oil-shale industry of Scotland, 516
Oil-shales, geologic age, 507
Old Baldy peak, Arizona, 238
Olivine, 160; alteration to serpentine, 162
Omara deposits, Arizona, 261
Openings, in limestones and dolomites, 452; in sedimentary rocks, 442; induced, 443; original, 443; in shales, 461
Ordovician, Healdton oil field, 599
Ordovician oil, Oklahoma, 600
Ore deposition and enrichment at Engels, Cal. (Graton and McLaughlin), 1, 379
Ore deposits, Prince William Sound, 523
Ore deposits of the Tetiuxe district, Russia, Geology and (Nishihara), 270.
Ore deposits, Classification of, based upon origin, deformation, and enrichment (Quirke), 607
Ore deposits, Magmatic, Sudbury, Ont. (Bateman), 391
Ore minerals of Sudbury ores, 575
Oregon, northeastern, surface waters, 80
Origin of, aplitic dikes, Black Lake-Thetford area, 175; chalcocite at Engels, Cal., 27; chrysotile veins, 195, 476; chrysotile-asbestos, 183; chrysotile-asbestos, Black Lake-Thetford area, 154; copper deposits of Engels, Cal., 4, 379; gneissic texture in galena ore, 650; manganese, Kansas, 474; oil, Tehauntepec Isthmus, 588; ore deposits, classification diagram, 608; peat deposits, 526; petroleum in Alsace, 203; serpentine, Black Lake-Thetford area, 157; shale-oil, 510; Sudbury ores, 398, 417, 429; titaniferous magnetites, 688, 691; water in oil sands, 376 (*see also* Genesis)
Origin of massive serpentine and chrysotile-asbestos, Black Lake-Thetford area, Quebec (Graham), 154
Orton, E., on oil in the Trenton limestone, 454
Ostwald, W., on properties of solutions, 71
Oxidation at, Engels, Cal., 19; Wonder, Nevada, 590
Oxide ore bodies, separation of, 427
Ozark uplift, waters of, 78

Palmer, Chase, *Diarsenides as silver precipitants*, 207–218; on maucherite, 208; on silver enrichment, 325; on the geochemical interpretation of water analyses, 57
Palmitota salt dome, 586
Panchromatic plates, 713
Papers on engineering ethics, 134
Paragenesis, criteria, 657; in ore deposits, 656; in Sudbury ores, 572; of opaque minerals, 298

Parsons, C. L., with Moses, A. J., review of book by, 559
Pearceite, 708
Peat, rate of accumulation, 531; composition and full value, 536
Peat deposits of Minnesota (Soper), 526
Peat machine, Alfred, Ont., 539
Peat-forming plants, 532
Pegmatites, formation of, at Engels, Cal., 9
Peneplanation in the Rocky Mountains, 542, 545
Pennsylvania, Healdton oil field, 599
Pentlandite, 398
Pepperburg, L. J., on estimated oil production, 449
Peridotite, alteration to serpentine, 157; chemical analysis, 159
Permian, Healdton oil field, 599
Perry, E. H., on kaolin investigations, 27
Petrography of Gunflint iron formation, 678, 684
Petroleum in Alsace, origin, 203 (*see also* Oil)
Petroleum, the accumulation of, The petrology of reservoir rocks and its influence on (Lauer), 435
Petroleum geologist, Ethics of the (Clapp), 105
Petroleum geology of the Isthmus of Tehuantepec (Hartley), 581
Petroleum industry, American (review of), 387
Petrology of reservoir rocks and its influence on the accumulation of petroleum (Lauer), 435
Phosphate, recent literature on, 100
Photography of colored objects, 713
Photomicrographic procedure, 710
Photomicrographs, oil-bearing rocks, 466–472; rocks from Engels mine, Cal., 8, 14, 16, 22; silver minerals, 342–353; silver ore, Cobalt, Ont., 230–234; Sudbury ores, 578, 579
Phreatic, definition, 494
Physiographic conditions and copper enrichment, 541, 545
Pirsson, L. V., on magmatic waters, 490
Place value, 47
Plant life in oil-shales, 510, 515
Plants forming peat, 532
Pleistocene, Isthmus of Tehuantepec, 584
Pliocene, Isthmus of Tehuantepec, 582
Pneumatolytic alteration of norite, 7
Pneumatolytic sulphides, development of, 11
Pocono formation, 359
Pocono sandstone, 360
Polished surfaces, Sudbury ores, 572
Polishing ores for microscopic examination, 699, 702
Polybasite, 227, 319, 708
Porosity of, rocks, 436; sands, 616
Powders for grinding and polishing, 703
Powers, Sidney, *The Healdton oil field, Oklahoma*, 594–606
Precious stones, recent literature on, 100
Preliminary note on the occurrence of chalmersite, $CuFe_2S_3$, in the ore deposits of Prince William Sound, Alaska (Johnson), 519
Price of coal, factors controlling, 43
Prince William Sound region, Alaska, mineralization of, 523
Producer-gas, 539
Professional ethics, 105
Protore, 607
Proustite, 314, 343, 707
Pugh sand, 600
Purdue, A. H., on oil in Kentucky and Tennessee, 454
Pyrargyrite, 314, 343, 707
Pyrite, 299, 342
Pyroxene, alteration to serpentine, 162
Pyrrhotite, 398

Quantitative measurements of minerals of the nickel-eruptive at Sudbury (Dresser), 563
Quartz diorite, 241
Quartz monzonite, 241
Quartz porphyry, analysis of, 273
Quartz veins, origin, 178
Quartzite, analysis of, 272
Quaternary, Isthmus of Tehuantepec, 584
Quebec, asbestos deposits, 154
Quirke, T. T., *Classification of ore deposits based upon origin, deformation, and enrichment*, 607–609

Radicles and their valences and reaction coefficients, 69
Rammelsberg, Harz Mountains, Galena ore, 656
Ransome, F. L., on galena ores of the Cœur d'Alene, 655; on juvenile waters, 491; on ore deposits of Cœur d'Alene district, 138; on ruby silver minerals, 315

Rare earth metals, recent literature on, 99
Rate of peat formation, 530
Ray, J. C., on the identification of minerals, 697
Reaction values, use of, 60
Reactions, for silver precipitation, 231; tetrahedrite, 308; zinc carbonate, 278
Read, T. T., on origin of copper deposits at Engels, Cal., 2
Recent literature on economic geology, 98–103
Red beds of Catskill formation, 368
Reeves, Frank, *The absence of water in certain sandstones of the Appalachian oil fields*, 354–378
Relation of the titaniferous magnetites of northeastern Minnesota to the Duluth gabbro (Broderick), 663
Replacement, Success mine, Cœur d'Alene district, 141
Replacement deposits, Arizona, 250, 265
Replacement veinlets, 226
Reports, professional, 132
Reservoir rocks, The petrology of, and its influence on the accumulation of petroleum (Lauer), 435
Resource cost of coal, 44, 48
Resurgent, definition of, 491
Resurgent fluids, 492
Reviews—
American petroleum industry (Bacon and Hamor), Hares, 387
California mineral production for 1915 (Bradley), Edwards, 292
Conservation in use of coal (Trigg), Bateman, 637
Economic geology (Ries), Bateman, 286
Elements of mineralogy, crystallography, and blowpipe analysis from a practical standpoint (Moses and Parsons), Schaller, 559
Die Entstehung der unterelsaessischen Erdoellager erlaeutert an der Schichtenfolge im Oligocaen (von Werveke), Bucher, 203
Oil field development and petroleum mining (Thompson), Rogers, 480
Principles of oil and gas production (Johnson and Huntley), Washburne, 290
A study of the magmatic sulfid ores (Tolman and Rogers), Kemp, 632
Rhyolite porphyry, 244
Rhythmic precipitation, 224
Richardson, G. B., *Note on Appalachian oil-field brines*, 39–41
Ries, Heinrich, review of book by, 286
Ries, H., and Watson, T. L., on magmatic waters, 490
Rock openings, 436
Rocky Mountains, peneplanation in, 542, 545
Rogers, A. F., on copper deposits at Engels, Cal., 2; on covellite, 330; on the cause of intergrowths, 314; on upward secondary enrichment, 3
Rogers, A. F., with Tolman, C. F., Jr., review of paper by, 632
Rogers, G. S., *The interpretation of water analyses by the geologist*, 56–88; review by, 480
Rosenbusch, H., on contact metamorphism, 151; on hornfels, 669
Rothwell, R. P., on professional ethics, 106
Rove slate, 666
Royalty on coal, 48

Safflorite, 215, 233
St. Clair, Stuart, on genesis of Sudbury ores, 565
Salt, in salt domes, 584
Salt domes, Isthmus of Tehuantepec, 585
Salt Lake oil field, sand from, 450
Salt lakes, 592
Salts of silver, The halogen, at Wonder, Nevada (Burgess), 589
San Cristobal-Capoacan salt dome, 586
Sandstone, analysis of, 272
Sandstones, openings in, 446
San Felipe limestones, 457, 469, 471
Santa Maria oil field, sand from, 448
Santa Rita and Patagonia mountains, location and character, 238
Santa Rita-Patagonia mountains, Arizona, The geologic distribution and genesis of the metals in the (Schrader), 237
Sauveur & Boylston reflecting microscope, 706
Schaller, W. T., analysis by, 248; review by, 559
Schirmerite, 328
Schistose texture, 653
Schofield, S. J., on the Belt series, 644

Schrader, F. C., *The geologic distribution and genesis of the metals in the Santa Rita-Patagonia mountains, Arizona*, 237–269
Scientific notes and news, 104, 205, 296, 390, 485, 561, 640, 722
Scolesite, 18
Scottish oil-shale industry, 516
Screens for photomicrographic work, 712
Secondary deformation, relation to paragenesis in ore deposits, 656
Secondary enrichment, 3
Sections, galena ore, 658; Healdton region, Oklahoma, 597; of rock from Success mine, Cœur d'Alene district, 146, 148 (*see also* Cross sections)
Seepage water, 494, 495
Segregations, banded of Duluth gabbro, 683
Selective segregation and gravitational separation theory of oil accumulation, 440
Selling cost of coal, 45
Sequence, in formation of Sudbury ores, 419, 434; of minerals at Engels, Cal., 24
Sericitization, 12
Serpentine, chemical analysis, 161; composition, 185; derivation from olivine, 189; massive, change to chrysotile, 191; physical characters, 186; relation to chrysotile, 185; specific gravity, 188
Serpentine belt, Quebec, 154
Serpentinization, 173
Shale-oil, 505; origin, 510
Shaler, N. S., on depth of peat accumulation, 529
Shaw, E. W., discussion by, 610; on water in oil sands, 362
Shear zone deposits, Santa Rita-Patagonia mountains, 254
Shearing in Slocan district, 651
Siderite, 31
Siebenthal, C. E., on groundwaters of the Ozark uplift, 78
Significant mineralogical relations in silver ores of Cobalt, Ontario (Bastin), 219
Siliceous waters, agency in alteration, 170
Silver, native, 322, 349; precipitants of, 222
Silver, The halogen salts of, at Wonder, Nevada (Burgess), 589
Silver deposits, early minerals of, 299, 303
Silver minerals, identification of, 707; on polished surfaces, 334; late, 309
Silver ores and their associated minerals, A microscopic study of the (Guild), 297
Silver ores of Cobalt, Ontario, Significant mineralogical relations in (Bastin), 219
Silver precipitants, Diarsenides as (Palmer), 207
Silver King mine, Arizona, 301
Silver-lead deposits, Slocan district, 643
Silversmith mine, Sandon, B. C., 300
Simpson formation, 599
Singewald, J. T., Jr., on microstructure of titaniferous magnetite, 686
Singewald, J. T., Jr., and Miller, B. L., discussion by, 92, 95
Skutterudite, 331
Slip-fiber, 200
Slocan district, B. C., 643
Slocan series, 643
Smaltite, 209, 224, 233, 331, 350; reaction, 231; replaced by argentite, 321
Smith, G. O., and Lesher, C. E., *The cost of coal*, 42–55
Snowbank granite, 665
Some quantitative measurements of minerals of the nickel-eruptive at Sudbury (Dresser), 563
Soper, E. K., *The peat deposits of Minnesota*, 526–540
Sosman, R. B., on heating tests on granite, 280
Soudan iron-bearing formation, 665
Speechly sand, 361
Sphalerite, 301, 342
Spurr, J. E., on magmatic waters, 490; on pyrargyrite, 314; on the relation of ore deposits to faulting, 667
Spurr, J. E., Garrey, G. H., and Ball, S. H., on tetrahedrite at Georgetown, Colo., 307
Stabler, Herman, on correcting errors in analysis, 67; on the reaction capacity of water, 60
Steiger, George, analysis by, 39
Stephanite, 318, 707
Stewart, C. A., on ore deposits in Arizona, 249
Stokes, H. N., on solubility of silver, 214
Stokes, Ralph, on genesis of Sudbury ores, 565
Stratigraphy of Duluth gabbro area, 664
Stromeyerite, 309, 344, 345

Structure, Appalachian geosyncline, 41; Appalachian oil fields, 356; Healdton oil field, 598
Subalkalinity, 70
Success zinc-lead deposit, Cœur d'Alene district, Idaho, Genesis of the (Umpleby), 138, 548
Sudbury, Ont., ore deposits, 391, 427, 632
Sudbury ores, sequence, 419, 434
Sudbury region, rock formations, 393
Sudbury series, 393
Sudbury syncline, 563
Suess, E., on juvenile waters, 489
Sulphide ore deposits, magmatic origin, 427
Sulphides, development of, 11, 15; in Sudbury rocks, 571
Sulphur, in salt domes, 584
Sundt, Lorenzo, discussion by, 89, 93
Superior mine, Cal., 33; photomicrographs of ore from, 22
Surface waters in northeastern Oregon, 80
Swamps, in Minnesota, 533
Synclinal oil pools, 618

Taber, Stephen, discussion by, 476
Tables—analyses of banded segregations of Duluth gabbro, 685; analyses of brines, 374; analyses of groundwater from the Midway oil field, Cal., 76; analyses of inclusions of banded Gunflint formation, 680; analyses of irregular bodies of titaniferous magnetite, 688; exposure for photomicrographic work, 714; estimated mineral percentages in Sudbury nickel-eruptive, 564; fracturing in the Sudbury nickel-eruptive, 569; microchemical tests, 711; natural association of iron, nickel, and cobalt, with sulphur, arsenic, and antimony, 229; openings in rocks, 442; preparation of specimens, 703; reacting values of Midway oil field waters, 77; waters from Coalinga oil field, 83; waters from Oregon rivers, 81; waters of Ozark uplift, 79
Taff, J. A., on the geology of the Criner Hills, 602
Tamosopo limestone, 456, 467, 470
Taneha sand, 448
Tarr, W. A., discussion by, 280
Technique of mineragraphy, Notes on the (Whitehead), 697
Tecuanapa salt dome, 586
Temiskamite, 208
Tertiary, Isthmus of Tehuantepec, 582
Tests, micro-chemical, 337
Tetiuxe district, Russia, Geology and ore deposits of the (Nishihara), 270
Tetrahedrite, 17, 306, 342
Tetranickeltriarsenide, 208
Texture of Minnesota peat, 535
Theories of oil accumulation, 436
Thomas, K., on Sudbury ore deposits, 564
Thompson, A. Beeby, review of book by, 480
Three R mine, Arizona, 254, 260
Tia Juana vein, 254, 260
Tin, recent literature on, 99
Titaniferous magnetites of northeastern Minnesota, The relation of the, to the Duluth gabbro (Broderick), 663
Titaniferous ores, economic possibilities, 685
Titanium in inclusions of banded Gunflint formation, 680, 686
Tolman, C. F., Jr., discussion by, 379; on chalcocite, 329
Tolman, C. F., Jr., and Rogers, A. F., review of paper by, 632; on the origin of Sudbury ores, 400, 404, 415, 428, 565
Tonopah, Nevada, halogen salts of silver at, 589
Topilo oil field, rock of, 457
Topographic divisions of Minnesota, 527
Topography, influence on peat formation, 527; of Duluth gabbro area, 664
Transportation cost of coal, 46
Trenton limestone oil fields, 454; rock of, 455, 468
Trigg, E. R., review of paper by, 637
Troctolite, 666
Tungsten, 257
Turner, H. W., on copper deposits at Engels, Cal., 2
Twenhofel, W. H., with Whitaker, W. A., *Manganese in the Dakota sandstone of central Kansas*, 473–475
Tyrrell, J. B., discussion by, 717

Uglow, W. L., *Gneissic galena ore from the Slocan district, British Columbia*, 643–662
Umpleby, J. B., *Genesis of the Suc-*

cess zinc-lead deposit, Cœur d'Alene district, Idaho, 138–153
Underground volatile agents, Genetic classification of (Daly), 487
United Engineering Society, Library Service Bureau, list prepared by, 134
Uses of peat, 340

Vadose, definition, 494
Vadose waters, 494
Van Hise, C. R., on openings in rocks, 441; on ore deposits of Cobalt district, 220; on schistose texture, 653
Van Hise, C. R., and Leith, C. K., on the geology of the Lake Superior region, 667
Van Orstrand, C. E., on porosity of the "hundred-foot" sand, 41
Van Tuyl, F. M., on openings in dolomite, 444
Van Winkle, Walton, on surface waters of Oregon, 80
Veins, Santa Rita-Patagonia mountains, 253, 262
Venango oil sand group, 361
Vesuvianite dikes, 174
Viscosity of oil and water, 617
Volatile agents, Genetic classification of underground (Daly), 487
Volatiles, definition, 488

Waddell, J. A. L., on professional ethics, 109
Walker, T. L., on temiskamite, 208
Wanklyn, J. A., on water analysis, 58
Washburne, C. W., review by, 290; on chlorides in oil field waters, 376; on the capillary concentration of petroleum, 439
Water, absence in certain sandstones, 354; from deep wells, western Pennsylvania, analyses of, 39; movement in oil sands, 377; Tetiuxe mine, analysis of, 278
Water analyses, The interpretation of, by the geologist (Rogers), 56
Water penetration of dry sand, 366
Water-table, 494
Waters, classes of, 65; classification of, 61
Waters of the Coalinga oil field, Cal., 82; of the Midway oil field, California, 74; of the Ozark uplift, 78; siliceous, agency in alteration, 170
Waters-Pierce well, rock from, 457, 471
Weed, W. H., on enrichment of silver ores, 299
Wegemann, C. H., and Heald, K. C., on the Healdton oil field, 598
Werveke, L. von, review of paper by, 203
Wheeler, S. S., on engineering ethics, 107
Wheeler oil and gas field, Oklahoma, 594
Whitaker, W. A., and Twenhofel, W. H., *Manganese in the Dakota sandstone of central Kansas*, 473–475
White, I. C., on a deep well near McDonald, Pa., 361
Whitehead, W. L., *Notes on the technique of mineragraphy*, 697–716; discussion by, 96; on graphic intergrowths, 314
Whitney, J. D., on water penetration of dry strata, 366
Winchell, A. N., on gabbroid rocks of Minnesota, 674
Winchester, D. E., *Oil-shale in the United States*, 505–518
Witwatersrand conglomerates, 717
Wolff, F. von, on resurgent emanations, 491
Wonder, Nevada, The halogen salts of silver at (Burgess), 589
Wonder rhyolite, 589
Woodruff, E. G., and Day, D. T., on oil-shale, 507
Wratton filters, 712
Wysor, D. C., discussion by, 282

Xenoliths, 678

Young, C. C., on manganese in water mains, 475
Young gray drift, Minnesota, 528
Young red drift, Minnesota, 528

Zapffe, Carl, on contact metamorphism of a basic igneous rock, 667
Zeolitization, 18
Zies, E. G., Allen, E. T., and Merwin, H. E., on copper sulphide enrichment, 28
Zinc, recent literature on, 98
Zinc carbonate, reactions, 278
Zinc carbonate ore, Tetiuxe district, Siberia, 275; analysis, 276
Zinc ore, Slocan district, 644
Zinc-lead deposits, Cœur d'Alene district, 138